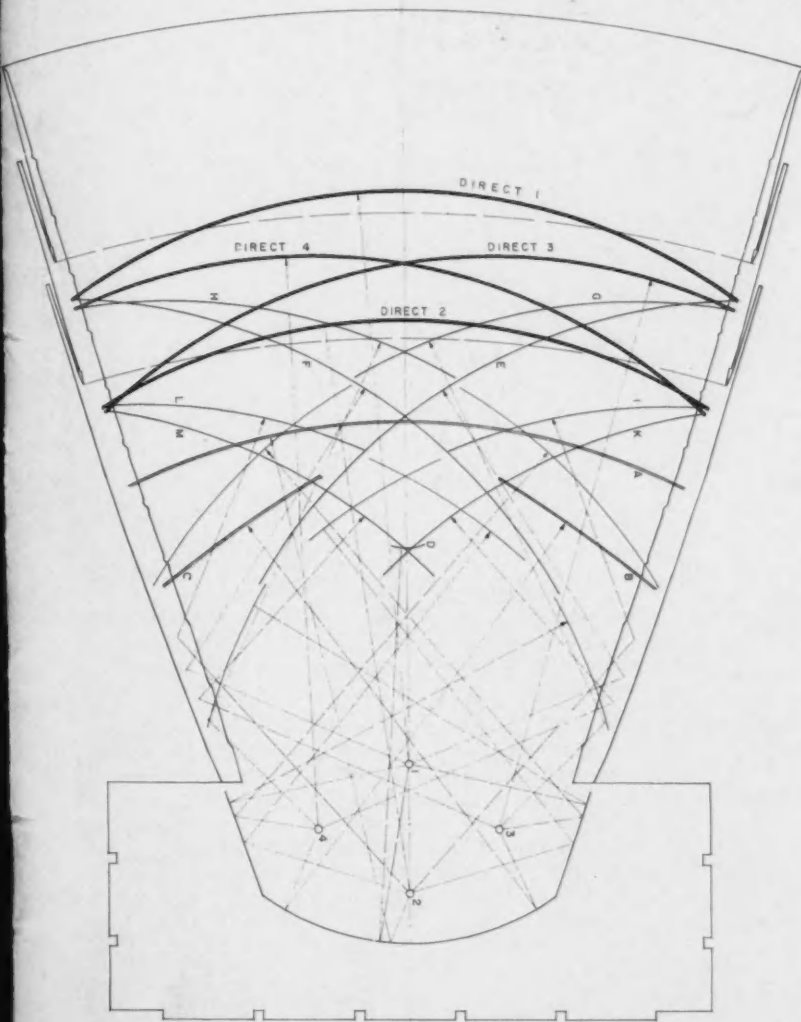


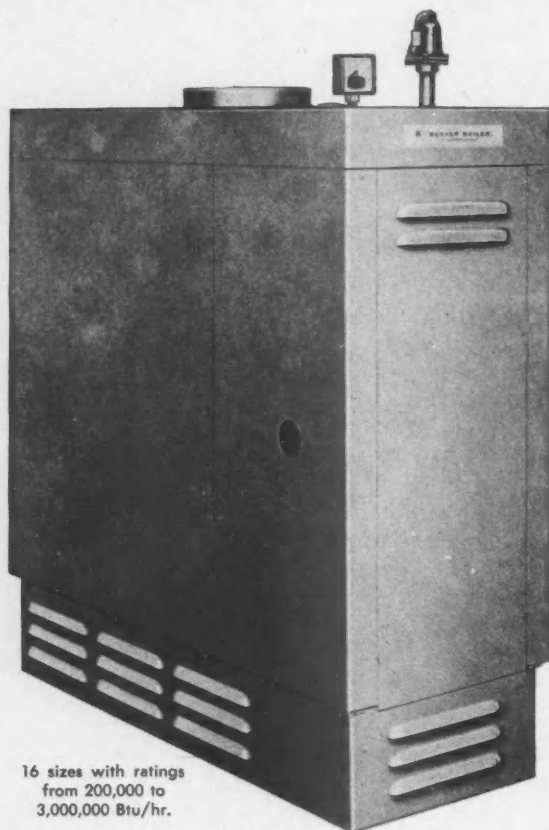
# ARIZONA ARCHITECT



NOVEMBER 1961, Vol. 5, No.

Auditoriums

3



16 sizes with ratings  
from 200,000 to  
3,000,000 Btu/hr.

## THE BEAVER WAS DESIGNED WITH THE ARCHITECT IN MIND!

The Beaver is one boiler designed and built on the terms you want most. This all-new, gas-fired, automatic family of boilers ranges in sizes from 200,000 through 3,000,000 Btu. And with this full line, you get the kind of flexibility to take on almost any job that comes along.

**In terms of versatility . . .** it will be hard to find a job you and the Beaver can't handle! Versatility for the Beaver stems from the "add-a-coil" feature. Separate coils can be added to make one Beaver do several jobs at the same time — area heating, hot water supply, swimming pool heating, combination heating and cooling, snow removal and others.

**In terms of design . . .** inside and out, the Beaver is built to take it and to deliver dependable performance for years to come. The Beaver boiler will operate longer because it has been designed and built around one key word — simplicity.

**In terms of installation . . .** no boiler can match the Beaver. It's a completely factory-assembled, completely enclosed package. No "arms," "legs," or appendages sticking out to complicate handling and installation. Even the largest Beaver will pass easily through a 43" doorway. A few quick connections to make and the Beaver is ready to go to work.

Contact us for more detailed information on the job the Beaver can do for you.



# BEAVER BOILER

BY CLEAVER-BROOKS

**CARNS-HOAGLUND CO.**

420 N. 15th Ave. • Phoenix 7, Arizona

Air Conditioning • Heating • Ventilating

## Central Arizona Chapter

Kemper Goodwin	President
Box 188, Tempe	
Lester Laraway	Vice President
Charles Hickman	Secretary
P. O. Box 904, Phoenix 1	
John Schotanus	Treasurer
Jimmie Nunn	Director
A. John Brenner	Director
David Sholder	Director

## Southern Arizona Chapter

David S. Swanson	President
2447 N. Stone Ave., Tucson	
Bernard J. Friedman,	Vice President
Robert J. Ambrose,	Vice President
Carl LeMar John	Secretary
4337 E. Fifth St., Tucson	
Arthur Darton	Treasurer
Sidney Little	Director
Gerald I. Cain	Director
Burr DuBois	Director
Fredrick M. Edson	Director
William Wilde	Director

### INDEX TO ADVERTISERS

Arizona Acoustics .....	31
Arizona Glazed Products Co.	
Spectra-Glaze .....	9
Arizona Highways Magazine .....	23
Arizona Masonry Guild, Program .....	21
Arizona Public Service Company .....	27
Arizona Sand & Rock .....	23
Arizona Structural Clay Products Ass'n.....	22
Arizona Wholesale Supply Company .....	6
Ari-Zonolite .....	20
Blackmore Sales Company .....	29
Carns-Hoaglund Co. ....	2
Engineers Testing Laboratories .....	28
Haskell-Thomas, Inc. ....	29
International Metal Products .....	32
Mathews Paint .....	28
National Shade Manufacturing Co.....	24
O'Malley Builders Hardware .....	24
Pipe Trades Industry Program .....	16
Plan Service of Arizona Contractors .....	28
Riverside White Cement .....	4
Southern Arizona Steel Fabricators Ass'n....	18
Standard Glass .....	27
Superlite Builders Supply .....	18
Thoren's Showcase & Fixtures .....	25
United Materials .....	12
Wright-Tamp Manufacturing Co. ....	14



**MEMBER PUBLISHERS ARCHITECTURAL COMPONENTS, 16**  
Official Publications of Components of The American Institute of Architects in 26 key states. Advertising and listing in Standard Rate and Data Service. Headquarters, 120 Madison Ave., Detroit 26, Mich. Woodward 1-6700, Eastern Office, 18 E. 56th St., New York 22, N. Y. PLaza 5-3180.

# ARIZONA ARCHITECT



Published by

ARIZONA SOCIETY OF ARCHITECTS  
CENTRAL and SOUTHERN ARIZONA CHAPTERS  
of THE AMERICAN INSTITUTE OF ARCHITECTS

Post Office Box 904, Phoenix 1, Arizona

Published monthly at 1423 North Third Avenue, Phoenix 3

Phil Stitt, Managing Editor

**Vol. 5, No. 3 — November 1961**

### IN THIS ISSUE

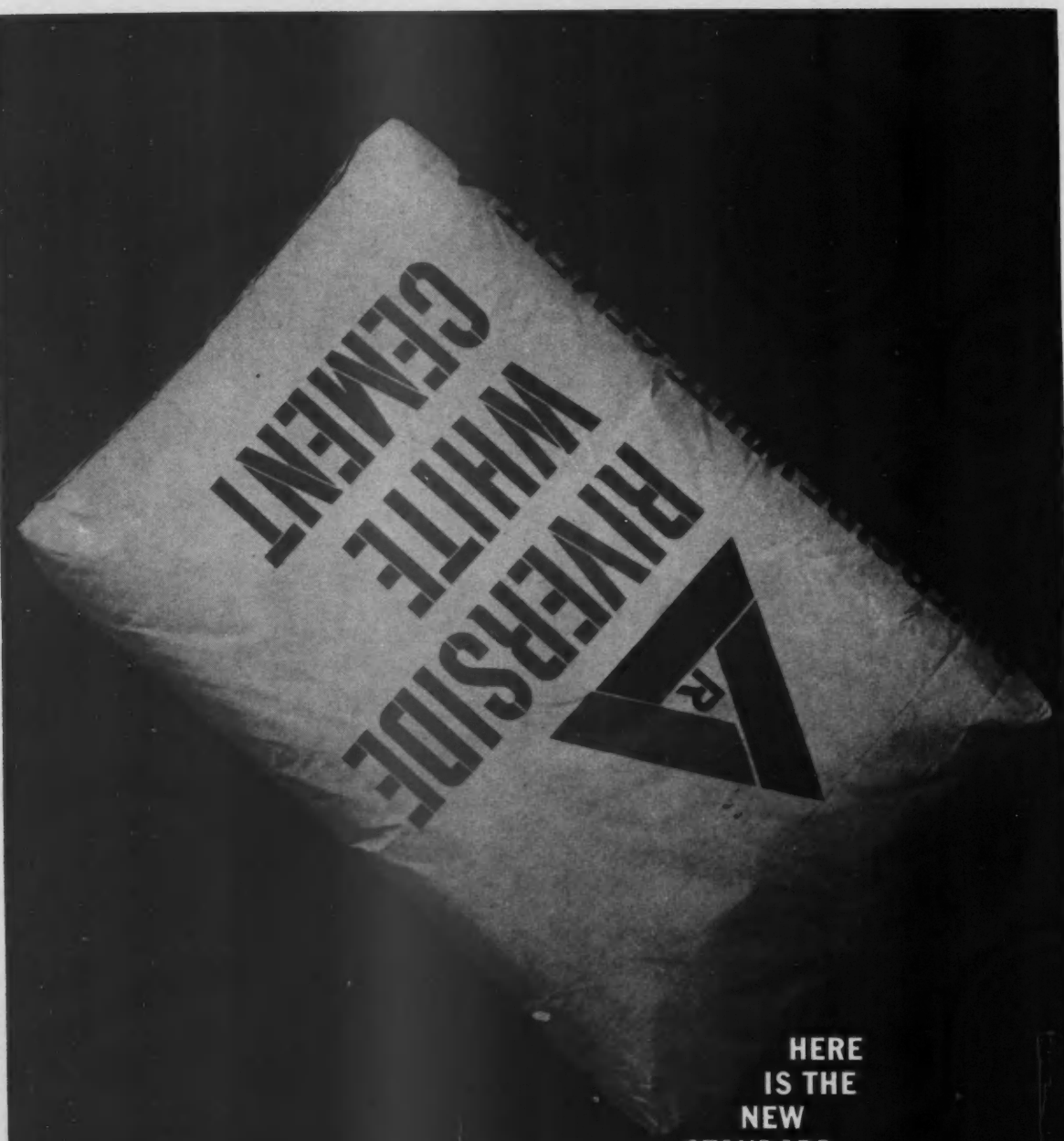
THE PRESIDENTS' PAGE	5
<i>The Editor's</i> PERSPECTIVE	7
<i>Convention Facilities</i> — A TALE OF TWO CITIES	8
Wendell E. Rossman — THE DESIGN OF AUDITORIUMS	10
Murry Harris, AIA — LOOKING AT THE SPECS	20
C.S.I. CHAPTER ATTRACTS MANY	22
<i>Letters to the Editor</i> — CRITIQUE	24
NEW ARCHITECTURAL REGISTRANTS	25
NEW PRODUCTS, PUBLICATIONS	26
<i>Planning Report Completed</i> — SURPRISE	28
AIA CHAPTER NEWS	30
HIGH RISE BUILDINGS ADVOCATED FOR TUCSON	30

COVER — Wave front pattern — horizontal plane — at one-tenth of a second following acoustic pulse. From report, "Acoustical Design and Testing of the Alberta Jubilee Auditoria," by Wendell Rossman, Martin F. Fayers and Arnold H. Steinbrecher.

### CIRCULATION AND POLICY

Circulation of Arizona Architect is to every architect in the United States who is qualified and registered to practice in Arizona; also to all members of Arizona AIA architects' staffs; to schools of architecture; general contractors; home builders; structural, mechanical, civil and electrical engineers; planning officials and church, school and government officials. To these circulation is free. Others may subscribe for \$4.00 a year, single copy 40 cents.

Opinions expressed herein are those of the editor or contributors and not necessarily those of the Arizona Society of Architects or its member chapters. Appearance of products or services, names or pictures in either advertising or editorial copy does not constitute endorsement by the Society or Chapters.



HERE  
IS THE  
NEW  
STANDARD  
IN WHITE  
CEMENT

RIVERSIDE WHITE, FROM THE FIRST WHITE CEMENT PLANT IN THE WEST. THIS IS A STANDARD TYPE ONE PORTLAND CEMENT. IT MEETS ALL A.S.T.M. SPECS, AND THEN SOME. IT IS UNIFORM, PURE AND THE WHITEST WHITE YOU'VE EVER SEEN (ASK FOR DEMONSTRATION IN YOUR OFFICE). WHEN YOU SPECIFY RIVERSIDE WHITE, ARCHITECTURAL AND TECHNICAL STAFF CONSULTANTS BACK UP YOUR SPECIFICATION WITH ON-THE-SPOT ASSISTANCE—FROM YOU TO FINISHED JOB. YOU CAN SPECIFY RIVERSIDE WHITE WITH COMPLETE CONFIDENCE. TODAY. NOW SOLD IN ARIZONA BY PHOENIX CEMENT COMPANY, 3550 N. CENTRAL, PHOENIX • AM 4-0511



## THE PRESIDENTS' PAGE



### SOUTHERN ARIZONA CHAPTER

David S. Swanson



### CENTRAL ARIZONA CHAPTER



Kemper Goodwin

Over the past three or four years I have noticed and felt the beginnings of a revitalization of the AIA in Arizona.

This period of reawakening has been fun, hard work, exciting and rewarding, especially to those of us who have participated in the program.

All of this background has begun to focus the Southern Arizona chapter's attention on several programs which are currently in the realm of active development: participation with Pima County in future planning their needs; work with the City of Tucson in modernizing the existing Planning and Zoning Ordinance; and continuation of the excellent Architect-Contractor Relations work in improving communications within the construction industry. When endorsed by the people of Tucson, we will actively work in the development of the Urban Renewal Program.

These activities did not just happen, but are the results of many hours of hard work on the part of many people within the profession — the exertion of leadership, knowledge and training, and the desire to contribute to the development of our community.

This attitude can possibly be best expressed by a letter I recently received from one of our members who I believe may have been a little impatient with the Chapter, but certainly is in accord with its aims:

"We would be deeply concerned for our future if we did not consider our profession to be one of leadership. We must therefore be bound to thoroughly analyze all the aspects of major issues. We are then most certainly bound to organize our collective thoughts and take whatever positive action we deem necessary to achieve the highest degree of workability in any program to which we subscribe.

"We must ask: Is this the spirit of our organization?"

"The essential and immovable question is the significance of ourselves and our moral indebtedness to the permanent responsibilities and obligations of our profession.

"If we seemingly ask too much, perhaps we are wrong in assuming a common philosophical framework from which should stem our collective actions.

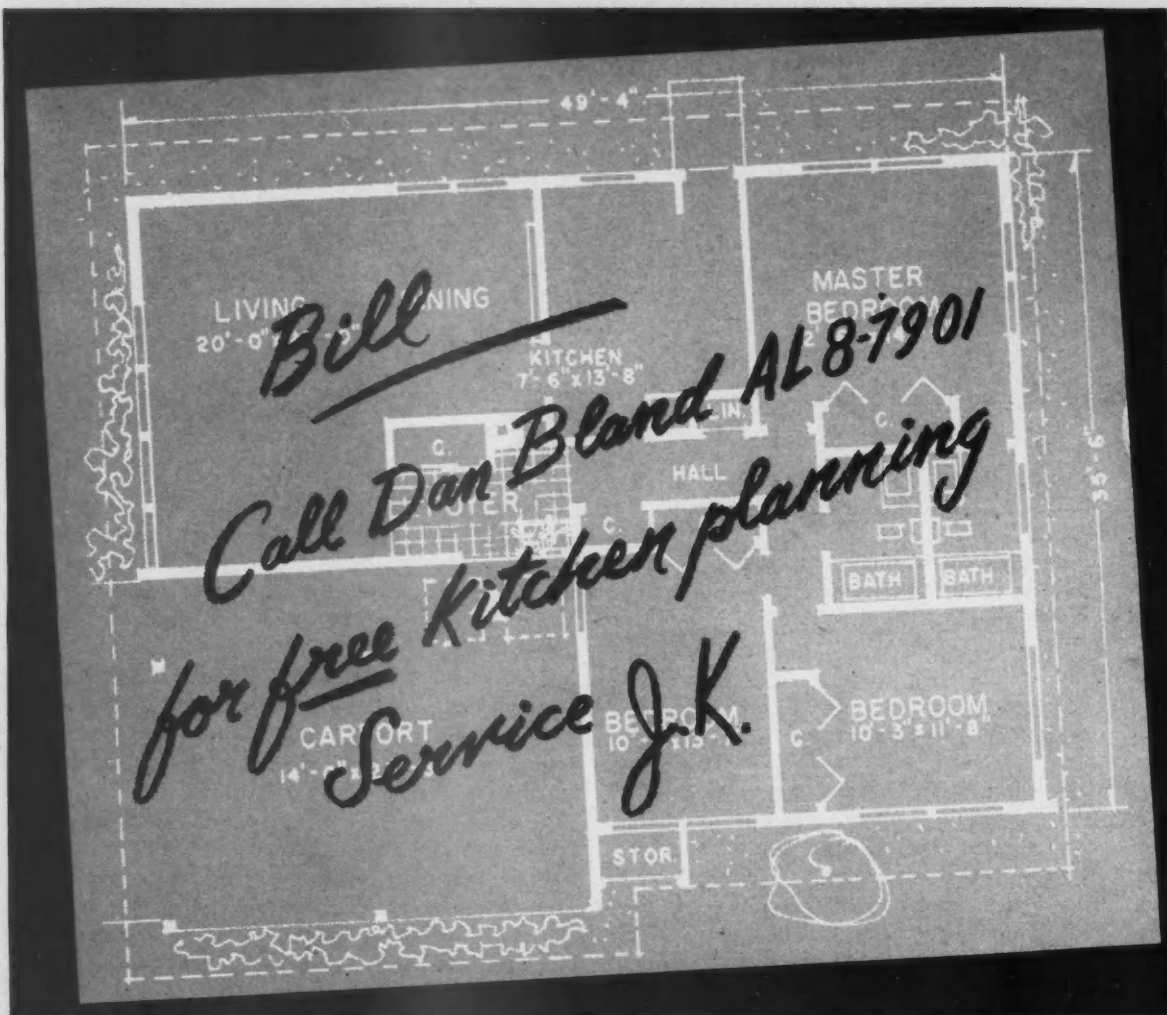
There are so many things I feel need to be said, but they should be said by someone with the real gift for translating thoughts into understandable words. Simple words, so that even a child could read and comprehend. Sharp, piercing words that will penetrate an old head, encrusted with years of complacency.

This month a small group of fellow architects were responsible for a delaying action which, in my opinion, will hurt us as a profession for many years to come. It is to these individuals, in particular, this column is written. These men think they are of the aristocracy; they seldom attend Chapter meetings; their primary concern is their own welfare, not that of the young architect just getting started or of those yet to come. I can count them on my two hands. They know the action taken and they must surely know that they represent only a small fraction of the practicing architects of this state.

It's time we took a new look at our State organization. The Arizona Society of Architects is composed of the two A.I.A. chapters. It is supposed to, but does it truly represent ALL of us? I submit, as presently organized, it does not. It is possible for sixteen men to veto the desires of a hundred. This is exactly what has happened. A small but vociferous group has blocked affirmative action on an issue which was approved, with only two dissenting votes, by the Society Council, composed of seven officers and directors from each chapter. We need a more truly representative State Society. There are ways; let's consider them.

"If we do share the common aim to work towards the betterment of our physical environment, then there is a basis for organizing to promote an atmosphere well suited to that objective."

One does not get power out of a stream by letting it meander all over a valley. Rather, by confining its course to a fixed channel, even a small stream will turn a wheel. The AIA is providing the channel by which—with general assent—our profession is able to make its skills available for the betterment of our communities.



REFRIGERATORS  
FOOD FREEZERS  
RANGES  
COOKTOPS AND OVENS  
DISHWASHERS  
DISPOSALS®  
WATER HEATERS  
HOME LAUNDRY  
LAMINATED SURFACES

Specifications and technical information on all General Electric components mailed on request. Ask for A.I.A. No. 31-P.

If you build or remodel custom homes, Arizona Wholesale Supply Company's kitchen planning service is available to you without cost. A single telephone call will bring Dan Bland, our kitchen designer, to see you, *the architect*, regarding requirements and specifications. You can leave all the problems of kitchen planning and layout to him.

The drawings he returns will show the time-saving, step-saving kitchen complementing your client's taste . . . and bring *you* compliments each time she pridefully shows it to her guests.

Of course, he will plan it around General Electric appliances because G.E.'s advanced design and superior quality will add immeasurably to the lasting beauty and efficiency of any kitchen.

More and more Arizona architects are using this time-and-money-saving service. Why don't you? Call Dan Bland, AL 8-7901, for complete information.

## ARIZONA WHOLESALE SUPPLY COMPANY

Authorized **GENERAL ELECTRIC** Distributor

## The Editor's PERSPECTIVE

THE LADY with the carefully coiffed white hair opens the curtain of the stage at Phoenix Union High School's auditorium, strides out and glares at her audience. She raises her head and voice simultaneously:

"How much longer must this go on?" she demands. "How many more years do I ask these great artists to put up with these facilities? When can I bring you companies that simply won't fit on this stage?"

The voice reaches a crescendo and the eyes flare as she castigates her patrons, reminding them of the distraction of lights, auto horns and airplanes "when I brought you Mitropoulos and had to put him in Montgomery Stadium."

Such zeal may seem a bit unusual before an evening of entertainment. Yet it has continued year after year and she gets away with it because her discomfited patrons know she's qualified to speak in such a manner; that she has caused echoes to resound throughout the community.

The lady, of course, is the indomitable Mrs. Archer E. Linde, the state's foremost impresario, who for more than 28 years has brought some of the world's finest artists and companies to Phoenix, starting when the Valley was a literal, as well as cultural, desert.

Her fervent pleas for a civic auditorium, joined in by countless other individuals and organizations, have resulted in frequent peaks of activity and a plethora of plans as numerous — and as unsuccessful — as those for a functional and beautiful state capitol.

A similar situation has existed in Tucson and was discussed in detail by Ned Nelson in the October, 1960, issue of *Arizona Architect*. Plans for a civic auditorium have been incorporated in Tucson's urban renewal project. But, as in Phoenix, it remains only a dream.

Throughout the last decade, an auditorium for the Valley has remained in the category of "almosts." Attempts made privately at makeshift shells and facilities have failed. Hopes have been raised for municipal action, then dashed by legal snares, disputes over location, and the diminishment of interest which follows frustration. Everybody agrees that Phoenix and Tucson absolutely need auditoriums. Neither has one yet.

The Phoenix Musical Theater and the Phoenix Symphony have attained stature despite the handicap of acoustically poor high school auditoriums. Like Mrs. Linde, they appreciate the availability of the halls, with a maximum capacity of about 1,300, but recognize that they were designed primarily for school, not public, use. Chamber of Commerce officials agree that Phoenix and Tucson now attract conventions which bolster the state's economy by sev-

eral million dollars; they agree, too, that the state misses out on most of the big conventions. Sports promoters and fans decry the lack of adequate indoor facilities; professional societies look for spacious exhibit areas — the same advantage sought, in a different manner, by agricultural and livestock producers.

It is this great divergence of interests that has been primarily responsible, we believe, for the absence of concerted community effort which has doomed previous plans. No one structure, no matter how large, and regardless of the location or who pays for it, can possibly accommodate all the groups who could benefit themselves and their communities by its use.

Thus the new plan unveiled this month by the Phoenix city auditorium committee appears, *at least on the surface*, to be a heartening step in the right direction. Although present emphasis is placed on securing legislative enabling action to permit an improvement district which can float a bond issue, the greatest impetus to successful fruition of the long-time dream well could be the thinking of the committee on what is needed.

According to Chairman Read Mullan, plans now envision a four-unit complex: an arena, assembly hall, exhibition hall and a theater. With such a division, he reported, studies show the complex would be in use at least 237 out of 365 days, based on *present* population. The breakdown shows 44 days for sports events, 32 for exhibitions, 25 for conventions, 18 for general entertainment, 67 for community service events and 51 for shows, symphonies and other theater uses.

Present studies also show that the complex would cost about \$5.4 million, exclusive of land, which leads us to wonder about the adequacy of size. (By comparison, ASU's new auditorium alone, with a capacity of 2,980 is expected to cost nearly \$3 million.) That is why we said that *on the surface* the plan appears hopeful.

State architects should assume — demand, if necessary — active roles in scratching beneath the surface, in offering their professional knowledge and experience to citizens who once again are working to fulfill a dream.

If they do, a beaming Mrs. Linde, personification of the hopes and efforts of thousands of citizens, can one night soon step between the folds of a new curtain, and then forget, for good, her lectures of the past two decades.

Phil Sitt



# A Tale Of Two Cities

The experience of two other western cities with community entertainment and convention facilities could be helpful to Phoenix and Tucson supporters of similar halls.

More than 10 years ago, El Paso built a coliseum with a permanent capacity of 6,400 and capable of seating 1,000 more if the event permitted chairs on the floor. It was originally intended as a multitrium for theatrical, as well as exposition use. El Pasoans quickly found the structure to be unsatisfactory for theater and orchestral groups and extensively remodeled an existing downtown structure into a theater with a capacity of 2,000. The coliseum still has wide use for sports events, home shows, conventions, livestock shows and dances.

El Paso, too, is attempting to lure large conventions with the bait of southwest climate and a gateway to Mexico. City officials learned a sad lesson last November, however. In a large bond issue covering several points, a new civic center with large facilities was one of only a few issues defeated. The reason? Detailed plans of what the center would contain and size of facilities had not been worked out before the election. The delay and expense of another vote, with concise plans, clearly publicized in advance, will be necessary before the civic center becomes a reality.

Portland's Memorial Coliseum offers a different kind of story, one of a successful structure clearly designed for specific purposes.

Arnott Duncan, sports columnist for The Arizona Republic, obviously was impressed when he visited it this year to cover ASU's basketball team in the NCAA western regional championship tournament.

In a column headed, "Hey, Phoenix! Dig This Barn," Dunc wrote:

"Portland's new Memorial Coliseum, known as the Glass Palace because it has a glass building surrounding another building inside, stands as a reminder to Phoenix. Its capacity of 13,000 for basketball and similar sports activities seemed a little large when it was built, but it's been filled already.

"... A second string Harlem Globetrotters team filled the arena ... There were 10,000 hockey fans in the Glass Palace ... Now Portland has claimed the NCAA regional tournament.

"How does that affect Phoenix? Plans for a new auditorium in Phoenix don't envision an area anywhere near a capacity of 13,000 and people in Portland are already wishing they'd made it big enough for 15,000. Portland spent \$8 million on its Glass Palace, but it would seem it could be increased to 15,000 with a few less fripperies and Phoenix, with its perpetual sunshine making for a real problem in the summer,

certainly wouldn't want solid glass walls surrounding the area."

The Glass Palace was designed with conventions and simultaneous public use also in mind. Large rooms and wide corridors permit use for exhibits, and such is the design of the facility that public skating was going on, unnoticed, at the same time basketball was being played upstairs.

The recent emergence of basketball at ASU has led sportswriters to speculate that the Sun Devils could attract at least 15,000 fans to several of their major games if facilities were available, and such attractions as the Globetrotters also could draw that many, as could, they believe, major prizefights.

They believe ASU and others could, and should, be considered potential regular renters of a community facility, the size of which should be planned accordingly.

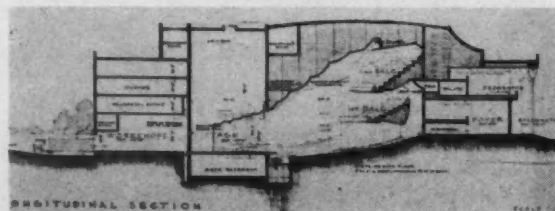
## Frank Lloyd Wright Auditorium Scheduled For 1964 Completion

It will be late in 1964 before a new auditorium for Arizona State University can be occupied, according to present schedules. (See *Arizona Architect*, March 1960.)

University officials hope to be able to present the final plans of the Frank Lloyd Wright Foundation to the board of regents for approval, clearing the way for a call for bids on the structure, expected to cost about \$2.8 million. Because of the size of the project it likely will be late February or early March before bids are opened. It will take more than two years to complete construction.

Although modifications have been made, the design remains essentially faithful to the original work of Frank Lloyd Wright, who was engaged in plans for the 2,980-capacity auditorium at the time of his death.

The Wright Foundation retained Prof. George Isenour, of Yale University, as consultant on the stage. He is designer of a new portable all-steel orchestra shell used for the first time last month by the Minneapolis Symphony. It was reported to be highly successful. Plans for the ASU auditorium incorporate use of such a shell, which will be stored near the stage.



Section, Frank Lloyd Wright Auditorium For ASU

1975  
2/61

## Put **COLOR** in **WALLS**... not on them!

18 standard and 26 accent colors of SPECTRA-GLAZE on standard concrete block shapes give you the most economical method of building beauty and permanence into your walls. The aesthetic touch of random patterns or murals go into the wall as it's laid, whether partition or loadbearing. The new  $\frac{1}{8}$ " thick face, resulting from 12 years of Burns & Russell research, retains its colorful and maintenance-free properties from the satin surface deep into pores of the block.

To designers, this combination of properties means:

**PERMANENCE** Precise face exceeds staining requirements of ASTM-C-126, and is so hard it can be used on floors.

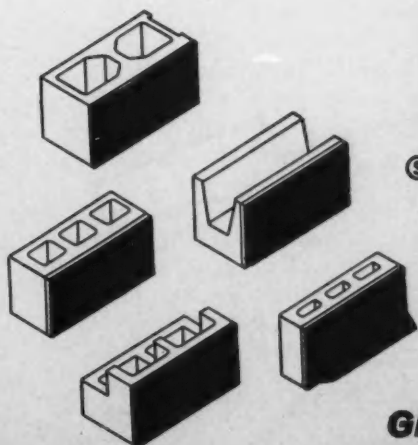
**BEAUTY** 44 colors; only  $\frac{1}{4}$ " exposed mortar joints.

**ECONOMY** 25% lower in-the-wall cost of concrete block shapes under other glazed masonry.

**VERSATILITY** modular dimensions; many standard shapes, some of which are shown below; thicknesses 2" to 12" for partitions and loadbearing walls without back-up.

**AVAILABILITY** 27 licensed manufacturers with distributors in principal metropolitan areas.

⑤ See SWEET'S CATALOG 4g/Bu for color chart and other details, or write for "Construction Details" and "Test Reports".



New 1975  
2/61

**Spectra-Glaze**\*

**Glazed concrete masonry units**

**ARIZONA GLAZED PRODUCTS COMPANY**

P. O. Box 421

Tempe, Arizona

Telephone WOodland 7-7575



\* Registered trademark for the product of  
THE BURNS & RUSSELL COMPANY  
Box 6063, Baltimore 31, Maryland



The concept of an all-purpose auditorium is cowardice and technical nonsense; we pay a very high price for its apparent flexibility.

# The Design Of Auditoriums

BY WENDELL E. ROSSMAN

Can I design an auditorium? Certainly, if I can find out what it is. Actors say it is a theater and musicians a concert hall. For the big money, a stage manager informed me, you have to have a place for Broadway shows and extravaganzas. I asked the man on the street, who suggested a hall where he could also see the fights. A convention manager and a cattleman, both interested in mass assembly, had identical ideas except for the position of those they wished to assemble. A cultured citizen exclaimed without hesitation: It is a building for the performance of the arts. I liked him at first sight.

I asked many more, the ones to perform and those who would pay. Then I called my research subjects together and presented them with my answer: "Friends," I said, "there seems to be a building which will suit all of you. It is called the *Absurditorium*, and that I cannot design."

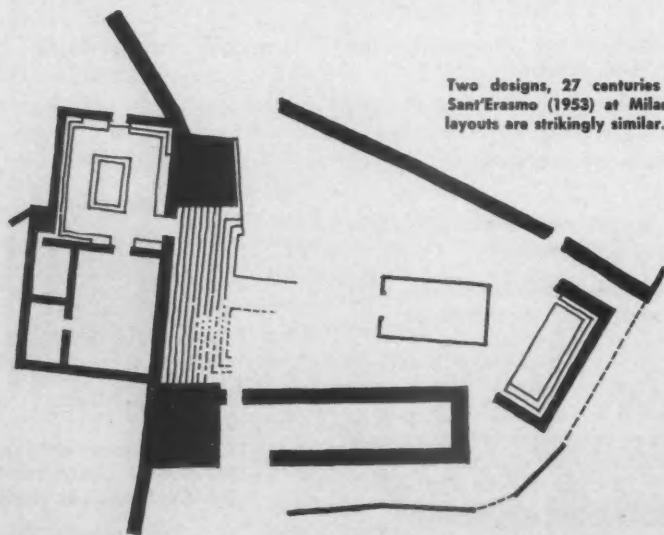
I knew I could not seat many thousands of spectators and expect them to see properly, or give the hall the acoustics worthy of the musicians and actors. If

I seated the audience comfortably, conversion for sports events or convention banquets would be a minor building alteration. Should I decide for esthetics favoring Beethoven or a heavyweight champion? Could I hope to remove the odor of a livestock show for the performance of Handel's "Messiah?" The inviolable and the desecrating could not be reconciled, I decided.

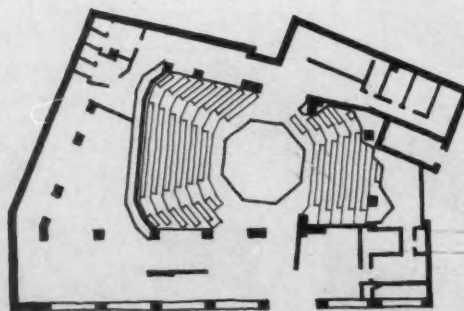
Human psyche and physiology have not changed. How then did our ancestors solve these questions? The Greeks, and particularly the Romans, were quite realistic. A drama belonged to the theater and a race to the arena. The flute and lyre did not call for a concert hall, but when music as we know it today evolved, the demand for a befitting environment brought forth its realization. The delightful blending of instrumental and vocal sounds led to the opera house. The pure concert hall developed into the most successful type of auditorium. The legitimate theater was modeled after the larger opera house and has, from time to time, led into experimental side developments. The classic opera house, of which such buildings as the Real Teatro San Carlo at Naples and La Scala at Milan are early examples, has become the prototype of most of our present day multi-purpose auditoriums.

Today we have a notable collection of auditoriums, successful and unsuccessful. With our technology we can build superior environments for practically any

About the author: Wendell Rossman, a corporate member of the Royal Architectural Institute of Canada, and now a member of the Phoenix architectural firm of Cartmell and Rossman, was a senior architect and chief of the acoustical division for the design of the Edmonton and Calgary "Alberta Jubilee Auditoria" before coming to Phoenix four years ago. He has participated, in Europe, on international seminars on acoustics. His subject is a timely one for Arizona.



Two designs, 27 centuries apart. The theater of Lato, 800 B.C. (left), and the Teatro Sant'Erasmo (1953) at Milan, Italy. In view of the time spacing, the basic concept and layouts are strikingly similar.



performance, but with this multitude of possibilities has come confusion. There are several reasons for this, such as unrealistic experimentation, misinterpretation of needs and transgression of basics. But all are subordinate to our society's choice of entertainment rather than enjoyment. Since enjoyment has receded to something like a gratis encore, art is being forced into the mundane sphere of co-existence as the lesser. Having been the motivating cause for auditoriums once, the performing arts must yield their requisites to those needed by entertainment. While the material of drama and music is still very much in existence, its place of performance is losing ground. This has distorted the logical grouping. The banal result is an auditorium which first of all must "pay its way," or is considered born dead.

The performing arts cannot be a means to profit. For the enjoyment we gain we must be prepared to pay the price we do for entertainment. Auditoriums must be given back their intrinsic functions. The concept of an all-purpose auditorium is cowardice and technical nonsense and under realistic analysis we pay a very high price for its apparent flexibility. It may not be born dead, but it is crippled and without character. We must never lose sight of the functional division *even under public pressure or the narrow aims of individuals and smaller groups*. To each his own auditorium. Then we can, as architects should, aspire to ever more perfect structures which once again become servants and not dictators to the performing arts.

Within the general term auditorium, the little theater, or more correctly, the intimate theater, is the smallest. It serves chiefly the performance of drama, has its specific atmosphere and can afford some eccentricity. The tendency to a synthesis of performer and spectator is quite obvious today and an attempt is made to extend it into the legitimate theater as well. This is perhaps less pronounced in the United States than in Europe. There we find strong support for the removal of all barriers between actors and audience, beginning with the Italian stage and the proscenium. For the extremists even the walls and ceilings are obstacles.

A typical proposal is the theater for free motion where the audience is placed in the center of a circumferential "space stage." All this is less new than one might think; it bears a surprising similarity to some of the oldest theaters known to us, like Lato - 800 B.C. As mentioned, the encroachment into the legitimate theater is already very much in the mind of many proponents. A fairly successful attempt is the Shakespearean Theater at Stratford, Ontario. But it must be remembered here that this theater was built solely for the performance of Shakespeare.

A nearly complete break with the traditional which would be the final result of this tendency is opposed by most playwrights and stage directors. Their counter-arguments are sound. Except for a few one act dramas



The Real Teatro San Carlo at Naples, Italy, built in 1737 and renovated in 1841, is one of the significant early opera houses. The principles by which it was designed are as valid today as they were in the 18th century.

by Thornton Wilder, all pertinent literature has been written for the Italian stage, which is exceptionally well adapted to human psychology. The clear separation by the proscenium places both spectators and actors into proper perspective, whereas the synthesis of the space stage demands an altogether different type of audience, almost a different culture. To come back, the closed curtain heightens the anticipation; partly visible settings on the space stage would diminish it. Attention is focused on a limited area and can thus be greater. If the performance is good, it will keep the audience spellbound without environmental influence.

Technically, a large audience cannot be seated close to a stage; only a few will have this privilege. The Italian stage permits a reasonably large audience, whereas the space stage, if large, would integrate the close spectators and lose the rest with increasing distance. Also, if proportion becomes gigantic, stage machinery, lighting and sound amplification problems become complex indeed. Good natural acoustics cannot be maintained in a large, ever changing environment. The space stage theater will, in my opinion, be confined to the intimate type.

The legitimate theater is, by virtue of available literature, tradition and pure technical reasoning,

PRESTRESSED CONCRETE MEANS

# SPACE

Large, column-free areas the problem?  
Precast Prestressed Concrete is the answer!

*Because Precast Prestressed Concrete can span larger areas economically, it is the ideal structural system for auditoriums, gymnasiums, and buildings requiring fewer supporting columns.*



UNITED MATERIALS, INC. ■ P.O. BOX 6497 ■ PHOENIX 5, ARIZONA  
TELEPHONE: AL 8-7741





quite well defined. Since seeing and hearing move into focus (for the space stage this is presupposition), seating and hall configuration become important. The most crucial aspect is the seating capacity, which assumes a precarious balance between lowest tolerable seeing and maximum number of seats. Providing the view is unobstructed, the distance becomes the limit. About 75 feet has been recognized as an acceptable standard, but many a theater today exceeds 100 feet. For volumes larger than 500,000 cubic feet, amplification is needed. If we make an approximate translation of this into seating in a rectangular or fan shaped plan, we arrive at about 2,000 seats. Compared to this, Greek theaters had a greater capacity by making use of 180 and more degrees of circular seating, an arrangement of which the large space theaters have taken advantage. Later theater architects reduced the arc and compensated partially by placing seats on walls and floor. Although this is quite unfortunately assimilated with the ornate pretentiousness of the renaissance, the multiple short balcony seating had many obvious advantages.

Then came floor seating only and the view has been expressed that this was an inevitable byproduct of democratic thinking. Since it was the first radical departure from the classic picture it brought two things: improved acoustics and immediate decadence. The latter manifested itself in a multitude of shapes, all having asymmetry in common. Since the Italian stage was retained by most proponents of irregular plan shapes, they stood in crass contradiction to one another. The Italian stage enhances concentration and asymmetry does nothing but distract, has no technical advantages and is neither organic nor functional. Acoustically, such chaos promotes diffusion but all the world's greatest halls have shown us that this is not entirely desirable.

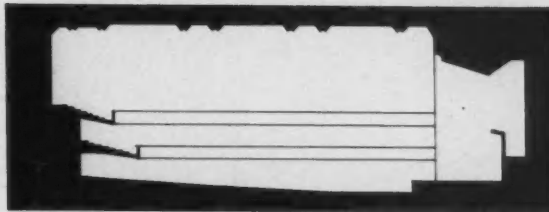
Due to its singleness in purpose, the concert hall became the most successful auditorium. Good seeing is very desirable here and hearing paramount. Capacities can be greater than the legitimate theater. It is also the least expensive one due to the absence of a stage, its rigging and ancillary facilities.

A further type, but not part of this discussion, is the arena or coliseum, a structure which must be irrevocably separated from all others. Its size is gigantic and functions are totally dissimilar. Technical problems are of a different nature, seeing becomes, due to distances, very approximate and hearing is always based on amplification.

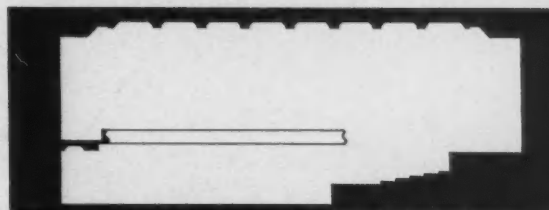
It is obvious that a merger of all types and their functions within the confines of one auditorium is absurd. But, once we have gained a clear distinction of functions and technical limitations, we may return to investigate combinations. Of these, the prosaic MULTITORIUM (multipurpose auditorium) may become fairly realistic. If we proceed by taking a concert hall and then add an Italian stage, we have both the concert hall and opera house. If we then reduce

## COMPARATIVE SILHOUETTES OF FOUR SUCCESSFUL CONCERT HALLS

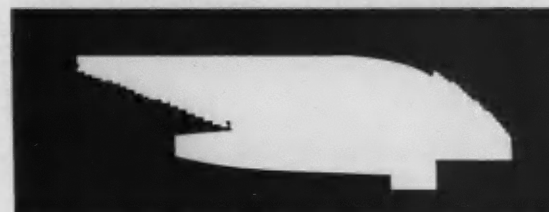
The silhouettes of these four halls illustrate the significant difference of ceiling heights between the classic and the modern auditorium.



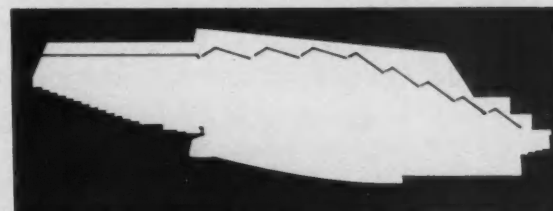
The Boston Symphony Hall. A highly rated concert hall with rectangular plan. Ceiling height is 55 feet.



The Concertgebouw at Amsterdam, Netherlands. Probably the world's greatest concert hall. The orchestra is moved forward into the hall. The plan is rectangular; the ceiling height is 60 feet.



The Kleinhans Music Hall at Buffalo, N.Y., generally referred to as the best in the United States. Based on a fan shaped plan, the hall has a central ceiling height of 40 feet.



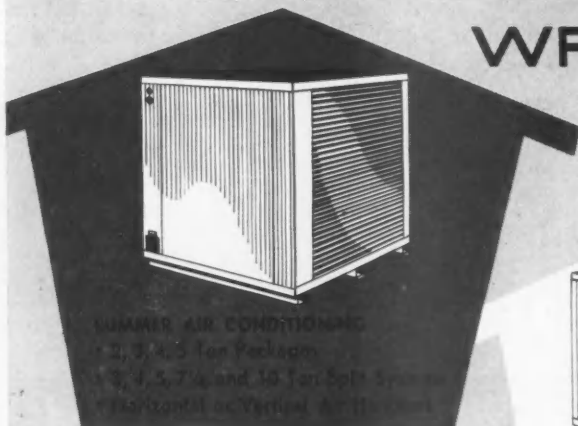
The Frederic R. Mann Hall at Tel Aviv, Israel. An exceptional concert hall in every respect. It has a central ceiling height of about 40 feet and a fan shaped plan.

the size, we gain a legitimate theater. If we add certain electronic aids and increase ancillary rooms we make it suitable for just about any stage performance. If we further increase social areas we gain exhibition space and a small convention center.

In the first three steps we have successively lost quality, in the last we gained some and broke even. At a price we can regain the loss. The loss is mainly in acoustics since good seeing has been maintained. For drama we need a clear crisp sound with maximum definition and loudness. This requires a small

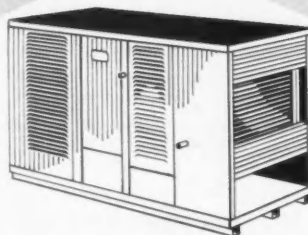
Save time, trouble and money on the jobsite — specify

## WRIGHT-TEMP Air Conditioning



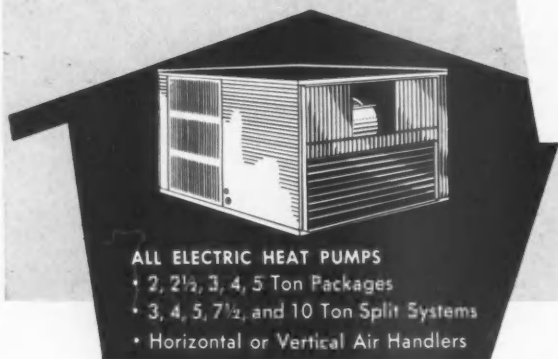
### SUMMER AIR CONDITIONING

- 2, 3, 4, 5 Ton Packages
- 3, 4, 5, 7½ and 10 Ton Split Systems
- Horizontal or Vertical Air Handlers



### FURNACE-COOLING COMBINATIONS

- Refrigerated Air Conditioning and gas-fired furnace in one unit
- 2 and 3 Ton Packages



### ALL ELECTRIC HEAT PUMPS

- 2, 2½, 3, 4, 5 Ton Packages
- 3, 4, 5, 7½, and 10 Ton Split Systems
- Horizontal or Vertical Air Handlers

🏠 The complete Wright-Temp line gives you greater design flexibility because the wide choice of models lets you select equipment best suited for any particular installation requirement. And, Wright-Temp distributors and dealers will work with you from initial planning to final sale, providing time-saving, trouble-saving, money-saving know how on your installations.

🏠 Wright-Temp Air Conditioning is designed and built to meet the extreme demands of Western and Southwestern climates with all units calorimeter tested and rated *beyond* ARI specifications. This extra design consideration assures that Wright-Temp equipment will perform as rated under even the most adverse conditions... it's your assurance of complete client satisfaction.



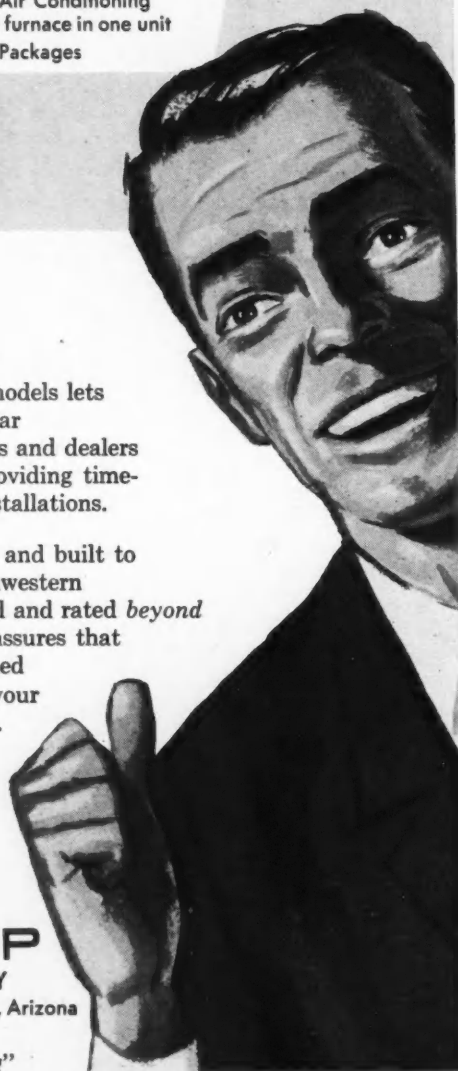
These emblems on Wright-Temp equipment certify to the safety, efficiency and reliability of design, construction and performance.

For complete information write to:

**WRIGHT-TEMP**  
MANUFACTURING COMPANY

2902 W. Thomas Road • P. O. Box 11247 • Phoenix 17, Arizona

"Creating New Climates for Better Living"







The F. R. Mann Hall at Tel Aviv, Israel. A view from the balcony toward the orchestra. Photo courtesy Dr. Leo L. Beranek.

volume and low ceiling. If music is added as for musicals and operas, reverberation time (RT) must be increased, preferably not at the expense of definition.

For pure music we not only desire definition and a precisely adjusted RT to frequency, but proper diffusion and a host of other characteristics. Fortunately, by paying sufficient attention to music, drama and opera most other functions are well cared for. The most complex and responsible task is the placement of all characteristics in order of significance. Then follows the translation through acoustics and finally the interpretation into structure and esthetic beauty.

The translation is the determining factor of what the hall will look like, its shape, volume, ceiling height, choice and distribution of materials, all integrated into an orderly system of highest possible esthetic measure. Although only the last step is the architect's sole prerogative, it is nevertheless necessary to have an understanding of the process, intending, of course, to reach the optimum.

For the multitorium, criteria must be arranged in descending order where instrumental music comes first, directly followed by song. For these conditions, natural acoustics is a condition *sine qua non*, whereas speech in drama and lower order functions can always be amplified. It is interesting to observe just what characteristics have made certain halls in this world so outstanding. The accepted yardstick, the RT, ranges from about 1.5 to 2.0 seconds, with almost invariably 1.8 seconds for the highest rated halls. Further, it would seem that rectangular halls are preferred. It is difficult to assess the validity of the reasons cited for this preference; perhaps the performers had more to do with it than the stated technical advantages. Most arguments for the rectangular plan have the

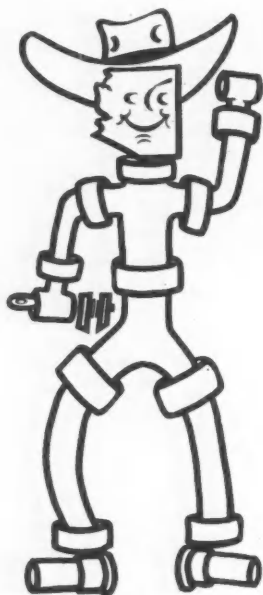
weakness that fan shaped halls have attained equal fame.

One fact, however, distinguishes the older rectangular hall like the Concertgebouw at Amsterdam and the Boston Symphony Hall or the now destroyed Gewandhaus at Leipzig, Germany: they all have markedly greater ceiling heights. This causes a long delayed first reflection which raises the hall effect, i.e. it leads one to perceive a very large environment. By actual volume per seat these halls are quite well in line with the latest and comparable fan shaped halls. This has led to the conclusion that our fan shaped halls should have less seating and greater ceiling height.

A few examples may well illustrate the various relationships. Assume a fan shaped hall with a volume of 500,000 cubic feet and general use of surface materials, will have an RT of 1.3 seconds. If we raise the ceiling one fourth, e.g. from 36 feet to 45 feet, without changing the surface materials, the RT will increase to 1.6 seconds. A nine-foot change is not much in terms of architecture but the difference in acoustics becomes substantial. Conversely, if we attempted to obtain the same effect through a change of surface, we need the removal of an equivalent of acoustic tile of nearly one-third of both side walls. Such a change would be most difficult to perform.

The greater ceiling height and longer delayed first reflections produce a more erratic decay. If the path length of the first reflection is longer by 60 feet compared to the direct sound, an echo can be heard. Practically this is not the case too often since many other reflections arrive after the direct sound. Only if the gap fillers are not intense enough can the

# A Two Way Street



*"Peter Piper"*

The building construction industry today has no other alternative but to recognize the fact that its continued progress and growth depend on the following fundamental procedures:

1. Active liaison must be at all times maintained and practiced by, and with, all of the component segments of the industry.
2. Communications and dissemination of information pertaining to industry affairs and practices must be constantly improved and become more encompassing to the entire industry.
3. Publicity and public relations, both external and internal in scope, are vitally necessary at every level, if continued progress is to be realized.
4. Cooperation between architects, engineers, general contractors and subcontractors, is a two way street and is a "must" for every segment of the industry.

## Pipe Trades Industry Program of Arizona

1616 East Maryland

Phoenix

CR 7-2634

The Kleinhans Music Hall at Buffalo, N.Y. Grace and discipline are architectural and acoustical elements. Photo courtesy The Kleinhans Music Hall.



ceiling reflection be distinguished as a separate image. Conceivably, the RT could be shortened if the hall effect is such as to compensate for the small loss. This in turn is beneficial to definition, since up to a certain degree a shortened RT increases definition. In several of the modern fan shaped halls, the RT was intentionally smoothed out by introducing a reflecting canopy above the orchestra. For all transient sound this aids diffusion, i.e. the space above is used as a reverberant chamber. The main effect, however, is short delay reflections which, due to their short length, retain the higher frequencies (air is the chief absorber at higher frequencies). This gives these halls their typical disciplined sound, much to the dismay of the dilettante musicians.

Another important quality is diffusion. It is physically interlinked with the decay, but for the listener it means from what directions the sound is coming. For example, does it mostly come from the source, or the ceiling or side walls, and how much is coming from the back? In the perfectly diffuse field, sound comes from all directions with equal loudness until the source can no longer be isolated. Architecturally, complete chaos is necessary to get this condition. Almost all music and spoken words are transient, which permits isolation of the source even in a very diffuse environment. When we look at the greatest halls, we find the field to be quite directional compared to a very diffuse field. Architecturally the choice of diffusivity means much indeed; the most subtle changes call for very different wall and ceiling arrangements.

So far we have spoken of qualities. It might be worthwhile to mention a few deficiencies. The most common ones touched upon in nearly every discussion about acoustics are noise, echoes, uneven distribution of sound, causing dead spots and foci. The

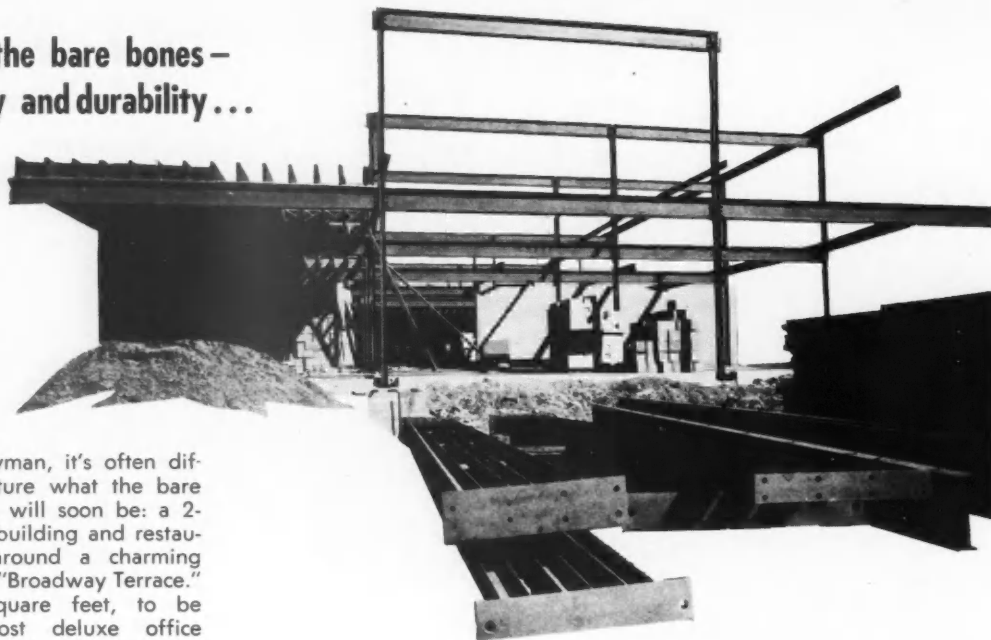
one deficiency which I will single out in this discussion is the indiscriminate application of the acoustic miracle drug, namely the acoustic tile, causing nearly as much faultiness in modern halls as have basic errors in older ones. In this day and age all of the above mentioned faults are simply not permissible; if they are made, the designer is incompetent.

When we take a close look at the combination of legitimate theater-opera house we find things differ just enough to make matters complicated. First of all, definition and syllable percentage articulation take the front seat. To achieve best conditions here we must lower the RT, smooth out the decay and reduce diffusion.

The question is, how far we can compromise and where? Fortunately the differences are not so great that if we were to meet half way the various characteristics would become unacceptable. But, *in a static hall characteristics cannot compromise and remain optimum*. To get this result the multitorium must be made convertible. Convertibility with the objective of changing the RT is a well known practice for radio and TV studios. A hall seating 2,000 to 3,000, on the other hand, will need large and complicated apparatus to facilitate a change.

I propose, therefore, that a change of volume by raising and lowering the ceiling is the correct method and technically not too involved. It also solves the problem of controlling the type of decay, whereby the greater height and volume attain a longer RT, plus a more erratic decay as desirable for music, and the lower height and smaller volume smooth the decay and reduce the RT, as is advantageous for speech. Finally, the smaller volume increases the loudness, which is most beneficial for speech. It is perhaps unfortunate that a change of the volume for the worse occurs automatically when the stage

...from the bare bones —  
beauty and durability...



To the layman, it's often difficult to picture what the bare bones, here, will soon be: a 2-story office building and restaurant built around a charming patio, called "Broadway Terrace."

18,000 square feet, to be Tucson's most deluxe office building will be divided into 28 suites. December 1st is the scheduled opening date. With steel at its core, Broadway Terrace will be as stable and handsome 20 years from now.

Architect: R. S. Maasen

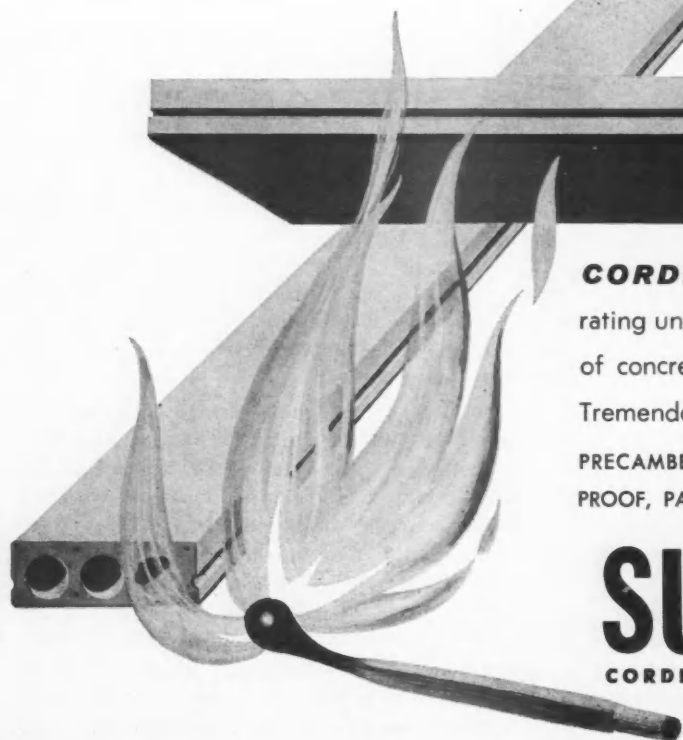
Builders: Bloodworth Construction Co.

Steel: Tucson Steel Fabricators, Inc.



• Kasper - Hall Steel Corporation  
• Tucson Ironworks • Tucson Steel Fabricators

*NEW* structural concrete unit  
for roofs and floors.



**CORDEK** is FIREPROOF. Two hours fire rating untreated. 3 hours fire rating with 1½" of concrete topping.

Tremendous savings in *insurance rates*.

PRECAMBERED, LIGHTWEIGHT, MONOLITHIC, SOUND-PROOF, PANEL CEILING, FAST ERECTION.

# SUPERLITE

**CORDEK CONSTRUCTION COMPANY**

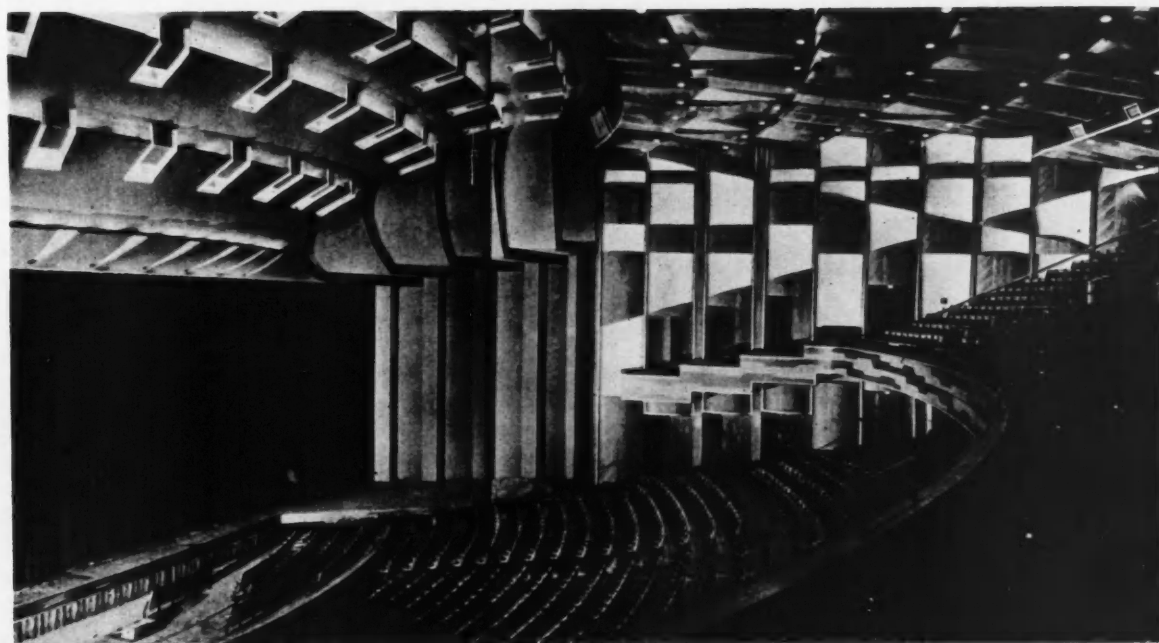
4012 N. Central Ave., Phoenix, Ariz., AM 5-4755

tower, i.e. the proscenium, is opened for drama. This can be fairly well corrected when stage settings are arranged in such manner as to reflect sound into the hall.

Beyond question, the legitimate theater can never be quite reconciled within the multitorium, which is simply too large and will therefore have only a limited number of seats that are really good. Many a designer arrives, therefore, at the conclusion that a partitioning of the hall would be the solution and several multitoriums have this feature. This alone does not solve it; the proscenium is too large and a portal must be flown down to bring the acting area into the proper scale, but intimacy is still lacking. I firmly believe that this approach is wrong and illogical. If one-half of the seats lie behind a partition, they remain idle and produce no revenue.

Seats have the faculty of not paying unless occupied, and if a performance making use of all seats is supplanted by the half-use, then it amounts to plain inefficiency, which is exactly the inverse of the basic concept of the multitorium. Practically, any partition will need huge tracks and moving apparatus and if drawn across will most profoundly alter the characteristics of the hall. The more realistic solution is to adjust the seat prices to compensate somewhat for the loss in seeing. Hearing can be regained through a high quality multichannel amplification system. The addition of a separate and highly versatile intimate theater in place of a mediocre legitimate one is for this and all other reasons an imperative part of a balanced multitorium.

**The Festspielhaus at Salzburg, Austria. An excellent opera house of very recent vintage. Salzburg has about one-fourth the population of Phoenix.**



The most intricate and also inadequately solved problem in the multitorium is the economic conversion from theater to concert hall. In existing establishments the expenses of conversion are often such that orchestras cannot afford them and must perform in an inadequate hall. Of the many systems in use and proposed, only one has a chance to succeed. This is a permanently built shell, which is stored like any big stage set. In future multitoriums it should be put on wheels and stored in a separate enclosure behind the last line in the stage tower.

Within the multitorium we must also look at the orchestra pit, which has become an indispensable requisite for most performances. Like other features of the traditional theaters it is intimately connected with the Italian stage and will remain in its logical position against most arguments. But it often provides for a little pitfall, not for actors or designers, but for the masters of mammon. The "fund saving" deletion of the mechanized enclosure of the pit has brought many a rueful afterthought.

It would be a great fallacy to believe a functioning and highly rated multitorium could do without all this. It is already a compromise and a concise analysis which would compel us to choose it in lieu of two or three specific structures must bring us the realization that we have to pay its price. Failure to do this would bring about more crippled and characterless creations. But planned according to precise auspices, the multitorium does become a realistic entity, well suited to our culture, society and habits. We must study it most thoroughly until we control its technical problems and free ourselves to pursue within these limits the expression of order and beauty, namely architecture.



## SPECIFICATIONS FOR APPLICATION of ZONOLITE ACOUSTICAL PLASTER

**MATERIALS:** Acoustical plaster shall be as manufactured by the Ari-Zonolite Company.

**NOISE REDUCTION COEFFICIENT:** The manufacturer of the acoustical plaster used must be able to furnish a Riverbank Acoustical Laboratories' test showing a  $\frac{1}{2}$ " thickness, machine applied, has an over-all noise reduction coefficient of 0.55.

**INSPECTION BY MANUFACTURER:** Approval must be given by the architect before starting application of acoustical plaster. The plastering contractor must furnish a letter from the manufacturer stating that inspection of the base for acoustical plaster was made; also certification that application of acoustical plaster was in full accordance with manufacturer's instructions and to specified thickness.

**NOTE:** IF SPECIFICATIONS MUST BE CONDENSED, IT IS STRONGLY RECOMMENDED THAT AT LEAST THE ABOVE THREE PARAGRAPHS BE INCLUDED.

**THICKNESS:** Minimum thickness shall be  $\frac{1}{2}$ ". (This does not include base coat plaster.)

**PREPARATION OF PLASTER BASE COAT:** When applied on new work, the base for the Zonolite acoustical plaster shall be a brown coat of standard thickness of gypsum or Portland cement plaster, dry darbied and broomed. (Wet darbying shall not be permitted). No smooth or slick areas shall be left on the surface.

**CONCRETE BASE:** Zonolite acoustical plaster may be applied to any clean concrete slab without further preparation. Exposed wire or metal shall be covered prior to acoustical application.

**APPLICATION OF ACOUSTICAL PLASTER:** Acoustical plaster shall be applied in two coats. First coat of acoustical plaster shall not be less than  $\frac{3}{8}$ " in thickness, rodged or darbied to a true and level plane. First coat shall be semi-dry before application of second coat.

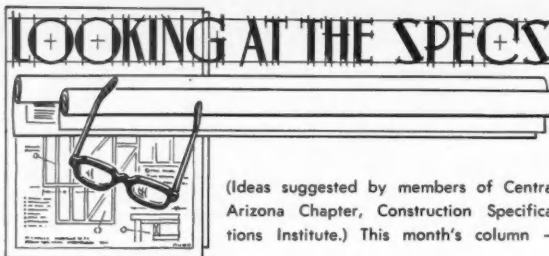
Second coat or finish shall be not less than  $\frac{1}{4}$ " thickness, machine applied in successive coats to specified thickness.

## Ari-Zonolite Co.

processors and distributors of  
Zonolite brand vermiculite products

Fill insulation • Plaster aggregate  
Acoustical plastic  
Stabilized concrete aggregate • Masonry fill insulation

1200 E. Glendale Ave. • Phone YE 7-1627  
Glendale, Arizona



(Ideas suggested by members of Central Arizona Chapter, Construction Specifications Institute.) This month's column —

By MURRY HARRIS, AIA

Clear meanings of words rather than quantity give specifications their true sense. Using fewer, clearly understandable, directly applicable words simplifies contract documents and avoids varying interpretations. Despite evident dollar and time savings resulting from shorter specifications, consider the problems avoided if no "gobbledeygook" remains to cause varying interpretations of meaning! We don't often go to formal arbitration or court for determinations, but who hasn't wasted hours debating interpretations between Contractor and Sub, Contractor and Inspector and finally, questioning the Architect for his version of obscure language for which he is ultimately responsible? Specifications should be *concise, clear and comprehensive*. Their most important quality is conciseness; from this the others follow. It is plain stupidity to write and accept specifications padded with error-producing verbosity.

Specification brevity is no single key to success. Another need frequently ignored is "easy identification." Years ago contractors basically excavated, poured concrete footings, built wood or masonry walls, a roof, and finished the interiors with electrical and plumbing work followed by painting. It was easy for specification writers to follow the same familiar pattern of job sequence in their specification organization.

Today, many specifications still follow that outmoded, illogical arrangement. With over 40 sections now commonly reflecting building technology for even conventional residences, it is as foolish to still list sections by Roman numerals as to scatter them through the main text in usually incorrect operational sequence. Specification sections should be indexed alphabetically and placed accordingly. This expedites finding information, and such orderliness helps avoid errors of omission and commission.

For additional clarity, many offices now make specifications more usable by including colored papers for various sections. This should be limited to three major trades consistently using colors as follows: Plumbing — light red-orange; Electrical — light blue; Air-Conditioning — light yellow-green.

Taking a clue from our doctors; to live long and effectively a specification should be lean and firm, not fat, flabby and subject to congestive failures. It is a hard-working tool and shouldn't be a color swatch book, advertising pictorial, or puffed-up novelette.

# The Question That Wasn't Asked

By R. A. LARABELL .

The C.S.I. conducted a panel discussion on "Bid Peddling" at its October meeting. Under the diplomatic moderatorship of Dave Sholder, AIA, we heard John Dickman and Marty Quinn express the general contractors' abhorrence of such practices. A highly biased audience, made up of a few architects, a sprinkling of consulting engineers, and a host of suppliers and sub-contractors, jointly decried the sinfulness of bid peddling. *Nobody defended bid peddling*—but everybody agreed that it runs rampant in Phoenix.

The question that wasn't asked was, "Why?" Why is there so much bid peddling going on if nobody believes in it? Perhaps we can answer this question if we determine who benefits, or thinks he benefits, from bid peddling.

First of all, let us accept Dave Sholder's distinction between bid peddling (before submittal of the G.C.'s bids) as opposed to bid meddling (after award of the G.C.). Who hopes to benefit by a knowledge of competitive bids early enough to permit "adjustment" of his own bid? The question is as rhetorical as the answer is deplorable. It is *not* a question of which came first, the chicken or the egg. Let's face it: *First of all, there must be a sub-contractor or supplier who wants to chisel!*

The sub-contractors who point the trembling finger of accusation at general contractors ought to examine their own ranks first. Certainly there will always be G.C.'s who are willing to exchange bid information for a preferential bid from a sub, but there would be no takers if subs had not first offered to prostitute themselves.

There are, however, two questions that spoil the general contractor's whimsical witness of the sub-contractor's suicidal scurry to insolvency:

1. At what point will the general contractor become financially involved in the failure of one of his subs?
2. How can the general contractor be certain that he got the final "best price"?

The general contractor who sees the other side of this coin anticipates the answers to those two questions.

Yes, although the subs are the first to sin, the industry must rely on the general contractors to be the first to dictate reform. A smart general contractor (one who doesn't want to get "involved") will spirit the death of bid peddling by refusing to accept, encourage or tolerate it in his office, and by awarding his work to the lowest bidder who qualifies on the basis of integrity, stability, quality material and superior workmanship.

The question that wasn't asked was "WHY?" The answer we offer here is "WHY NOT!"



This meeting should create questions and answers and be educational and informative to all in attendance.

The Subject:

## "THOROUGH UNDERSTANDING"

A live demonstration of a "pre-job" conference presented by a panel of notables in their particular field.

Date: Friday, December 15, 1961  
Time: 12:00 to 12:40 p.m. — Lunch  
12:45 to 1:35 p.m. — Program  
Place: Arizona Ranch House Inn  
5614 North Central Avenue  
Phoenix, Arizona

Plan Now To Attend Friday,  
December 15th

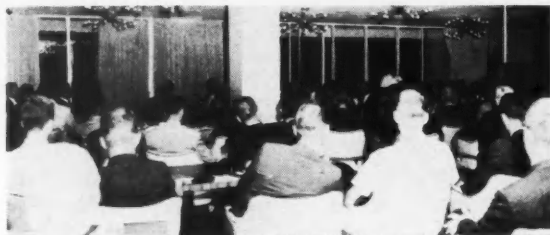
MASONRY INDUSTRY  
PROGRAM OF ARIZONA  
ARIZONA MASONRY  
GUILD, Inc.

## Active Phoenix C.S.I. Chapter Attracts Large Following

Under the vigorous leadership of its president, Milan Srnka, AIA, and board of directors, the Phoenix Chapter of Construction Specifications Institute is attracting substantial interest and attendance this year. Part of the crowd attending the October meeting is shown at the right, during the lively question and answer period.

The CSI unit meets every third Wednesday at the ABC Club in Mayer Central Building, with a social hour at 6:00 o'clock and dinner at 7:00 p.m. Membership is now approximately 70.

The highly controversial subjects of "Bid Peddling"




and "Substitutions" featured the October and November meetings. The December 20 meeting, to be moderated by Walter Biddle, of the engineering firm of Biddle and Young, will consider problems of air conditioning, and feature Paul Engebretson of Conditioned Air Co. and Ted Boothroyd of the E. B. Bomar Company.



CSI officials at the November meeting were (from left, standing), Milan Srnka, AIA, president; Jack E. Lewis, AIA, Los Angeles, regional CSI director; Lee Ruger, director; Harold F. Smith, treasurer; Murry Harris, AIA, director; Scott Parsons, vice president; Harry Eichberger, past president; (seated, left) Arthur Dusenberry, secretary; and Robert W. Myers, director. Not in picture is Max Kaufman, AIA, director.

# CLAY BRICK

FOR TEXTURE, WARMTH AND DURABILITY



GRABE BRICK COMPANY / LOUIS DeVRY & SON / PHOENIX BRICK YARD  
TUCSON PRESSED BRICK COMPANY / WALLAPAI BRICK & CLAY PRODUCTS



October CSI meeting featured a lively but inconclusive talk on bid peddling practices. Participants were, from left, John Dickmann, contractor; moderator David Sholder, AIA; and Marty Quinn, contractor.



In November the merits and evils of product substitutions were evaluated by, from left, Robert Larabell of Arizona Acoustics; moderator Kemper Goodwin, AIA; and contractor Dan Mardian. Report on this session will be carried here next month.

*Have you sent your  
Christmas copies of*

**ARIZONA  
HIGHWAYS**

*yet?*

## ARIZONA SAND AND ROCK COMPANY

*Quality manufacturing with after-sale service*

### PRESTRESS DIVISION

Single Tee Building Members  
Hollow Core Slabs

Call AL 4-8465 for free brochure.

2400 S. Seventh St. • AL 4-8465 • P.O. Box 959, Phoenix 1, Ariz.



## SEE THE AMAZING LOUVERED WINDOW SCREEN THAT KEEPS ROOMS UP TO 15° COOLER!

- Tiny louvers block hot sun, glare and flying insects — let soft light and breezes come right in!
- For the sunny side of your clients' buildings . . . Prevents fading . . . Saves air conditioning money.
- Minimum maintenance! Made of strong, rust-proof aluminum.



**SHADESCREEN\***

by KAIBER ALUMINUM

Wholesale All Aluminum Screen Doors — Patio Covers —  
Screens — Awnings — Storm Doors — Shadescreens

\*Trademark

**NATIONAL SHADE MFG. CO.**  
3914 E. Thomas • Phoenix • CR 4-0073

FOR



**SARGENT**

**BUILDERS HARDWARE**

(Exclusive Arizona Dealers)

PLUS

- |                 |                   |
|-----------------|-------------------|
| • Schlage Locks | • K-V             |
| • McKinney      | • Peabody & Cipro |
| • L.C.N.        | • Grant           |
| • Hall-Mack     | • Von Duprin      |
| • Rixson        | • Glynn Johnson   |

FOR

**Complete  
Architectural Services**

Specifications • Detailing • Scheduling • Inspections



**WILLIAM WELLING, AHC**  
**RICHARD M. GERHART, AHC**  
**RICHARD H. DECKER, AHC**



**O'MALLEY**

BUILDERS HARDWARE

**PHOENIX**

4700 N. CENTRAL AVE.

**TUCSON**

247 N. 4TH AVE.

## Critique

To the Editor:

Many thanks for your copy of *Arizona Architect*. (February—*The Mess We Live In*). I just wish to God you had the circulation of the Reader's Digest and the active, not to say belligerent, help of all its readers. Your illustrations are devastating, but I fear a couple of generations has already grown up that thinks this is the way a town should look.

I expect to be coming through Phoenix with El Presidente and staying over a day or so after you have celebrated the vast services to the state of Senator Hayden. I hope I may give you a ring and possibly we could bend an elbow.

**ALISTAIR COOKE**  
New York

To the Editor:

We have been greatly impressed by your issue on the sign problem, and would like to have extra copies to give to some of our interested public officials, if you have some to spare. You have a fine magazine. Enclosed is a copy of our publication which carried parts of your articles.

**RUTH R. PARKS, Exec. Secy.,**  
Orange County Chapter, AIA

To The Editor:

Mr. Andrew Steiner, co-chairman of our Urban Design Committee, would like to have 13 copies of *Arizona Architect* for February (*"The Mess We Live In"*). This issue really impressed him and he wants to hand them out to some folks who are working with him on Urban Design.

**SALLY C. PRICE, Exec. Secy.,**  
Georgia Chapter, AIA

To the Editor:

It is very seldom that something comes across my desk that moves me to pass along my congratulations, but your June cover of *Arizona Architect* certainly rates high as a design piece and I am all for your continuing this format. It looks like you have a winner, visually at least. My hearty congratulations!

**HENRY C. RICHTER,**  
Vice President & Creative Director,  
Ptak & Richter Advertising, Phoenix

To the Editor:

Once more congratulations are in order for a most timely and well conceived issue of *Arizona Architect* (August). In addition, I feel you deserve the thanks of all architects in the Region for your enthusiastic efforts in their behalf. You and your magazine go far toward making us as unified as we are.

**R. LLOYD SNEDAKER, Director,**  
AIA Western Mountain Region,  
Salt Lake City



To the Editor:

For some time I have been intending to let you know how much I appreciate your courtesy and that of the Arizona Society of Architects for sending me copies of *Arizona Architect*. In my judgment, it is one of the finest publications of this sort I have seen. Both you and the Society should be congratulated on this extremely effective means by which you tell the story of the architects' functions, problems and aspirations.

MARION DONALDSON, Superintendent,  
Amphitheater Public Schools, Tucson

To the Editor:

I would appreciate receiving a copy of your publication for my son, a high school senior who is planning to attend Pratt Institute next fall.

My purpose is to expose him to the contents of professional trade publications such as yours in order that he may develop a better perspective of his chosen educational pursuits and also to stimulate his interest to a greater degree.

I am employed by a Cincinnati advertising agency and find that your publication is highly rated on their list. Thus, the reason why my request is being directed to your publication...

MRS. M. B. REITER,  
Cincinnati, Ohio.

## NEW ARIZONA ARCHITECTS NAMED

The Arizona State Board of Technical Registration has announced that the following have been certified to practice architecture as of November 13, 1961:

Edmond Thomas Casey ..... Box 157, Scottsdale  
Louis Leslie Coon ..... 4434 E. 18th St., Tucson  
Robert W. Fairburn ..... Albuquerque, N.M.  
J. Frederick Fleenor... 3020 N. 27th St., Phoenix 16  
Joe Bill Pierce ..... Midland, Texas  
Leon B. Senter ..... Tulsa, Oklahoma  
David Coe Wheatley..... Taliesin West, Scottsdale  
Alvin Louis Wiehle ..... Taliesin West, Scottsdale

—AIA—

Good architecture has always been the result of persuasion, education and obstinacy. Designers of all ages have had to fight for its realization. Truly architectural design has never come into being without the aggressive spirit of its creator. Most of all, good architecture took time and for that reason did not attract quick investments.

— Sibyl Moholy-Nagy

## NOTICE — ANNUAL ROSTER ISSUE

The January issue of *Arizona Architect* will carry a complete roster of members of both AIA chapters. The list of paid up members will be supplied to the editor by your chapter secretary. If you contemplate any address change from that now shown by the secretary, be sure to make the change known before January 1.

# Quality...

is the only TRUE

# economy

throughout Arizona...



Beautiful Grain, Skillfully Matched

## QUALITY

## ARCHITECTURAL MILLWORK

schools homes industry

Complete Installations

*Thorens*



SHOWCASE & FIXTURE COMPANY, INC.

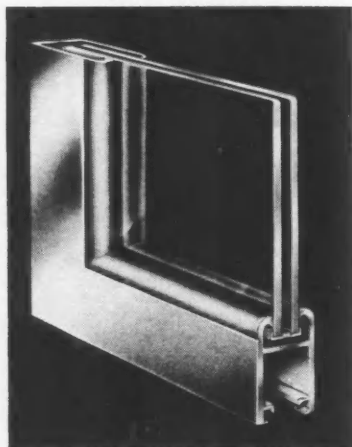
PHONE WO 7-7517

149 FARMER AVE., TEMPE

BACKED BY 200 YEARS OF FAMILY EXPERIENCE IN CABINET WORK AND DESIGN

# New Products, Personnel, Publications

## NEW SLIDING DOORS



**Tucker Aluminum Products**, manufacturers of aluminum windows, doors and tub enclosures, announces its new Insul-Pane Sliding Glass Doors.

Manufactured entirely by Tucker, all panels are anodized aluminum, with a gold anodized door also available. Single or double glazed doors will operate in Tucker's one frame. It is available either KD or assembled.

Prompt delivery throughout the U.S. is offered. In cold weather, the door never frosts and there is no condensation; buyers save on both heating and cooling bills. Insul-Pane is competitively priced.

Although Tucker has national distribution, certain areas are still open for distributors. Information on this and on Insul-Pane Doors from Tucker Aluminum Products, Inc., Box 1651, Miami 1, Fla.

## REFRIGERATED MALL



The new \$20 million Chris-Town shopping center in northwest Phoenix contains 63 business firms, 53 of which are under one roof and open onto the world's longest refrigerated and enclosed Mall. Doors into the shops along the Mall are usually left open, adding to the inviting atmosphere, but creating heating and cooling problems.

These problems have been solved for the 63,000 square foot Mall by air conditioning of 180 tons of Arctic Circle Straight Cooling and Heat Pump units. Eight units are 7½-ton Remote Heat Pumps with supplementary electric strip heaters; eight units are 7½-ton Straight Cooling; four are 10-ton Straight Cooling; four are 4-ton Heat Pumps with electric strip heaters and one unit is a 4-ton Straight Cooling model.

Arctic Circle Refrigerated Air Conditioning is manufactured by **International Metal Products Division of McGraw-Edison Co.**

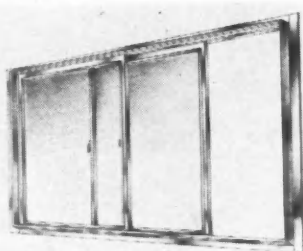
## HORIZONTAL SLIDING WINDOWS

Stanley Building Specialties introduces new horizontal sliding windows in both a four and two track model in two and three sash series. Designated as Stanley Models 22 and 32, with integral fin trim these windows meet all new FHA requirements.

An integral fin picture window is available to be used separately or matted to the slider and the new windows are factory glazed with snap-in aluminum glazing bead. They can be reglazed without disassembling the sash.

An extruded finger pull is an integral part of the sash. The light weight sash is easily removed for cleaning in an unlocked position and the windows are available with interchangeable screen and storm panel. All windows are equipped with rugged heavy duty cam-action sash lock for positive seal and security.

Although the company has national distribution, choice territories are still open. For details write: **Stanley Building Specialties**, Division of the Stanley Works, Box 3757, Miami 1, Fla.



## LIGHTWEIGHT LAMP

**Tensor Electric Development Co.**, 1873 Eastern Parkway, Brooklyn 33, N.Y., announces a new, incandescent 10-inch high, spacesaving, variable intensity lightweight lamp for persons engaged in close work.

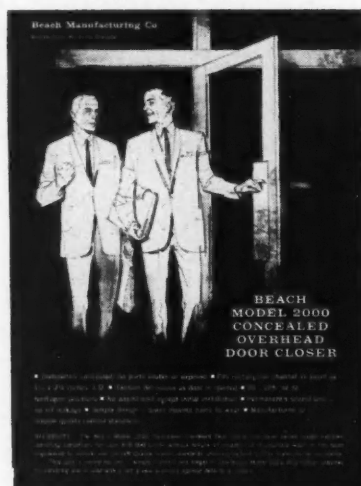
Called the Tensor Precision Work Lamp Model 5900, the new product features a reflector with a diameter of only 2½", cork insulated for almost complete heat control.

A five-position switch is provided so the lamp may be used at intensities ranging from 12.2 to 202 foot candles, using an ordinary 6-volt bayonet type bulb.

An extra feature of the lamp is an electrical outlet which can be used for meters, small tools, appliances and other apparatus, and it can be used when the lamp is on or off. It comes in two colors, black wrinkle or smooth white enamel and is priced at \$46.50.



## BEACH DOOR CLOSERS

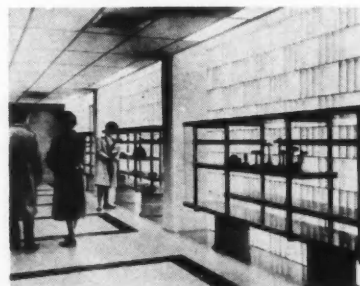


A four page, color brochure showing complete specifications for the new Beach Model 2000 Door Closer is available on request.

The entire assembly and components illustrated in detail are the door closer unit, forged steel arm, bottom plate and ball pivot assembly.

Write **Beach Manufacturing Company**, Architectural Products Division, 2000 S. Santa Fe Avenue, Compton, Calif.

## GLASS CORRIDOR MUSEUM



When budget limitations threatened the museum area at Indiana State College's new science building, architects Miller, Miller & Associates of Terre Haute solved the problem by incorporating the museum in corridor space.

Use of a corridor museum, however, presented a lighting problem which the architects solved by making the entire west wall a curtain wall of glass blocks. This transmitted the needed soft over-all lighting, as well as serving to backlight dramatically the exhibits displayed in glass-enclosed shelves placed against the glass block wall.

A design element was incorporated in the wall by use of a recently introduced rectangular glass block — 4 inches wide by 12 inches long — as well as the regular 12-inch square blocks.

All blocks are products of the **Pittsburgh Corning Corporation** and incorporate a special blue-green "Suntrol" fibrous glass mat to minimize glare and instantaneous heat gain.

Complete details from **Pittsburgh Corning Corp.**, 1 Gateway Center, Pittsburgh 22, Pa.

## COLORADO ARCHITECTURE EXHIBIT TO BE DISPLAYED HERE

Colorado buildings have been winning architectural awards since the St. Louis World's Fair in 1900 and can claim three buildings represented in the American National Exhibit in Moscow, 1959.

Proud of their state's progress, the Colorado chapter of the AIA organized the photographic exhibition, "One Hundred Years of Colorado Architecture," which will be displayed at Arizona State University Nov. 27 through Dec. 31.

Circulated by the Smithsonian Institute, the exhibition has been called a capsule record of the amazing progress of architecture in the U.S. Its display at ASU is sponsored by the School of Architecture, where it may be viewed, free, from 9 a.m. to 9 p.m. Mondays through Fridays and until noon on Saturdays.

The historic progression from log cabins to boom towns to Victorian homes and churches to the turn-of-the-century imitations of European buildings to the present poured concrete, functional structures has been carefully documented by the Colorado chapter on 55 panels. Architects represented include Guy Burgess, Winter Prather, Warren Reynolds, Ezra Stoller, F. E. Edbrooke, Burnham Hoyt, James M. Hunter, I. M. Pei and T. MacLaren.

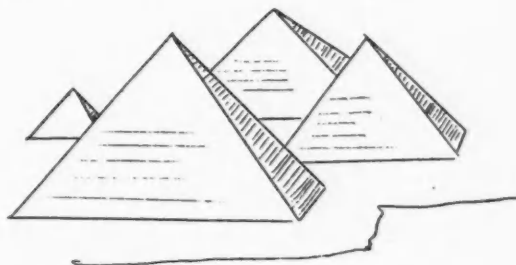


**W**hen you design for the years, the hours spent in planning are all-important.

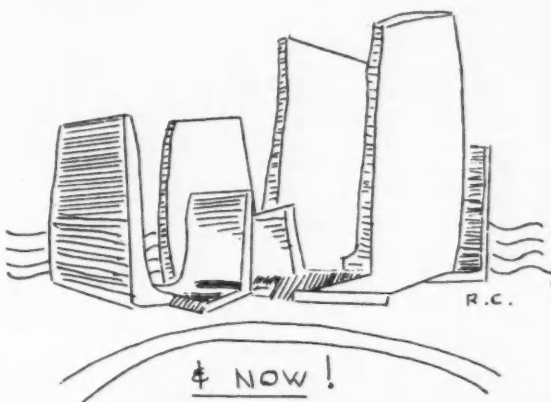
To help those hours count most, our specialists will be pleased to work with architects or consulting engineers on design and installation of natural gas or electric equipment. No obligation.

ARIZONA  **Public Service** COMPANY  
75 YEARS OF SERVICE TO ARIZONA

THE WAY THEY DID IT . . .



THEN,



& NOW!

— From AIA Orange County Chapter Bulletin

## Adventures in Glass & Aluminum

VELDA ROSE  
MEDICAL CENTER



## LUMINAIRE WINDOW WALLS

Recent Arizona installations of this versatile system include:

- Velda Rose Medical Center, E. Mesa
- U. S. Post Office, Peoria
- First Nazarene Church, Glendale

"MADE IN ARIZONA FOR ARIZONA LIVING"

Telephone  
275-8551

LUMINAIRE  
**STANDARD  
GLASS**

FAST  
LOCAL  
SERVICE

5321 EAST WASHINGTON • PHOENIX 34

## ARCHIE



©1961 Engineers Testing Laboratories  
Phoenix — Tucson

## PLANNING REPORT COMPLETED FOR TOWN OF SURPRISE

The town of Surprise may be in for just that in the way of expansion during the next two decades, but as a newly incorporated community it has a unique opportunity to guide its growth in accordance with a plan.

The first, and perhaps major, stage of such a plan is contained in a planning report prepared for Surprise, 18 miles northwest of Phoenix, by the Maricopa County Planning and Zoning Department at the request of the town, incorporated less than a year ago.

A special 1961 census showed a population of 1,574 persons, a considerable growth compared to the eight persons who founded Surprise in 1937, when the area now known as El Mirage was a cotton patch, and compared to ten years ago, when 300 persons resided there in "numerous substandard houses and cabins."

Forecasting population for small communities is difficult, the report said, because of lack of accurate past information and a small base figure; thus projections for Surprise are related to the same economic base as that used for the Phoenix urban area. In the path of such new developments as Youngtown and Sun City, described in the report as "only the beginning of larger and more complex communities to come," Surprise has a 1980 population forecast of

SINCE 1882  
Quality  
Paints

## MATHEWS PAINT

MORE ARCHITECTS SPECIFY IT!  
MORE PAINTERS USE IT!

- Standard stock colors
- Specification materials in stock

*You Cannot Beat Tradition*

MATHEWS QUALITY, SERVICE, AND QUALIFIED  
ARCHITECTURAL REPRESENTATIVES ARE AT YOUR DISPOSAL

PHOENIX  
4717 N. 7th St.  
CRestwood 9-9571

LOS ANGELES  
598 West Ave. 26  
CApitol 1-2111

## PLAN SERVICE of ARIZONA CONTRACTORS

Owned by Subcontractors Conference  
of Arizona

Designed and operated for the benefit  
of the construction industry.

- MODERN FACILITIES
- AMPLE PARKING
- REFRIGERATED AIR CONDITIONING
- 14 MODERN TAKE-OFF BOOTHS

3501 North 16th Street Phoenix  
CR 9-2339

*Managed by Dean Carlson*



4,700 persons, more than a 300 per cent increase.

Of that total, 4,000 could be accommodated theoretically within the present corporate limits of 616.2 acres, of which 447 acres was vacant when the department made its land-use survey. However, if future population growth should be higher than the forecast, it could be necessary to annex a limited amount of adjoining land in order to provide for future population needs.

Other highlights of the planning report include:

There are two principal advantages to a community for having a large amount of underdeveloped land: it allows room for new growth outward from existing developed areas, with the community having full control over the extension of the existing street and land-use patterns; and it provides better protection from undesirable developments that may take place at the edge of town, capitalizing on the community without adhering to the town's building standards or paying local taxes. Principal disadvantage is that the community is obligated to provide public service to the entire area, costly when the development is scattered.

The future community should not be sprawling, but compact to provide essential public services efficiently and at reasonable cost. Yet, there should be enough open space so that everyone can enjoy a reasonable amount of light, air and public convenience. Shopping centers and places of employment should be located

#### Answer To

#### **WHERE IS THIS IN TUCSON?**

Last month's photo was of the new downtown motor branch of Southern Arizona Bank, for which Architect William Wilde, AIA, was given an "orchid" by the Tucson Beautiful Committee of the local chamber of commerce.

conveniently in relation to the residential neighborhood.

The recently adopted zoning ordinance is an important tool for implementing the future land-use plan, but should soon be supplemented with subdivision regulations.

A significant increase in population or industrial development will require an expansion of the existing water system. Surprise does not have a public sanitary sewer system; present methods of disposing of sewage do not function well in urban areas and can become a serious health hazard. Surprise will soon reach a time when an improved sanitation system will become an absolute necessity and such a system should be initiated prior to reaching the critical stage.

Surprise is currently without a park system but is negotiating for land to establish a community park north of Grand Ave. Based on a national standard of one acre of park land per 100 population, the community is deficient by nearly 16 acres.

## ***Plumbing and Heating Specialties***

# **BLACKMORE**

**SALES**

MANUFACTURERS' REPRESENTATIVES

**TUCSON**

**2020 E. 13th Street**

**Phone MA 4-2475**

**PHOENIX**

**519 E. Thomas Road**

**Phone 277-2795**



**BUILDING SPECIALISTS  
RESIDENTIAL  
COMMERCIAL  
INDUSTRIAL**

**Specializing in large accordion partitions**

**TORJESEN • HUF COR**

**COILWALL**

**SPACESAVER • WACO WALL**

## **HASKELL-THOMAS, INC.**

**310 S. 29th St. BR 5-7511 Phoenix**

## CENTRAL ARIZONA CHAPTER NEWS



The November 2 meeting featured a talk and illustrated lecture by noted architect A. Quincy Jones, FAIA, of Los Angeles (above, right, with James Elmore, AIA, head of ASU School of Architecture.) The talk, given at the Phoenix Public Library auditorium immediately following the chapter dinner, was heard by a capacity crowd of architects, students and visitors and will be reported in detail in the next issue of *Arizona Architect*. The talk was sponsored jointly by the Chapter, the School of Architecture at ASU, and the Phoenix Library.

The annual meeting and election of officers will be held December 7 at Los Olivos Restaurant.

## MIDWAY MEETING POINT

One of the most useful meeting halls in the state is the conference room in city hall at Casa Grande. Available without charge upon application to the City Clerk, and useful for meetings of up to about 20, the room is in constant demand for conferences between Tucson and Phoenix members of state organizations. Pictured below is a recent meeting of the Council of the Arizona Society of Architects, which offers its thanks and commendation to the city officials of Casa Grande for making available this half-way-point meeting place.



Thirty

## SOUTHERN ARIZONA CHAPTER NEWS

A capacity turn-out of members featured the November 8 meeting to hear reports on the new AIA contract documents and architects' liability, given by Bernie Kinsock; the proposed new zoning recommendations for Tucson, prepared by Nick Sakellar, Mark Edson and Ned Nelson; and a discussion of the problems caused by an unrealistic maximum fee set by law on public works.

The members unanimously endorsed the proposed zoning changes which offer a unique formula to permit high rise buildings. (See below).

A slate of officers for 1962 was announced by the nominating committee, and additional nominations may be offered at the **December 6 meeting**, at which the annual election will be held.



## HIGH RISE ADVOCATED FOR TUCSON

An original solution to high rise building zoning problems that may set an example for other cities, has been developed by Southern Arizona AIA Chapter members and recommended to the special zoning team of the Tucson Planning and Zoning Commission.

Architects Nicholas Sakellar, Ned Nelson and Mark Edson (*Arizona Architect*, September), in their recommendation, point out that the freedoms offered in their method will afford a more interesting city development and eliminate the vast monotones that are caused by the present set back regulations and height restrictions.

The plan recommends that the present B-3 zoning ordinance remain substantially the same with the exception of the elimination of the height limit and adoption of a floor area ratio and volume usage.

Because congestion — physical and visual — is caused at the ground level and is promoted by the present code, the architects feel that elimination of the height limit but tying it in fixed ratio to requirements for more ground space would actually encourage buildings to be vertical in a manner that will assure open spaces and elimination of congestion at the important ground level.

(A detailed illustrated report on the plan will be presented in an early issue.)

—AIA—

Nothing promotes an understanding of environmental planning better than active participation in it.

— Walter Gropius

# HI, THERE!

## REMEMBER ME?

I'm **Dezi Bell**, and I was introduced on this page a few months ago.

**Arizona Acoustics** has commissioned me to explain a few fundamentals of architectural acoustics from time to time.

Let's start with a problem I encounter at least once a week:

"We've been gypped! We bought acoustical plaster and it ain't!"

I've heard this complaint so often, especially since arriving in Arizona, that I can visualize the application and explain the problem in my sleep. (And I'm told that I do.)

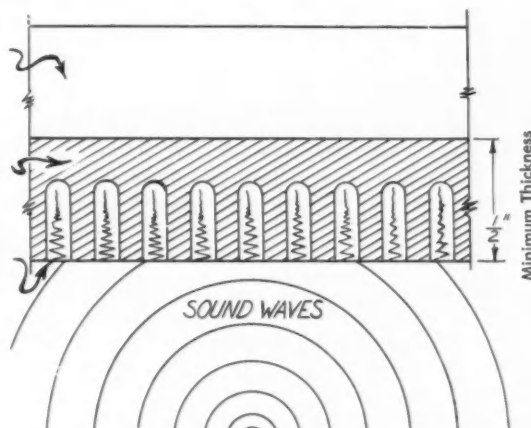
Let's see just what an acoustical material is and how it works.



AIR COLUMNS OR SPACE BEHIND MATERIAL for additional low frequency absorption (optional).

LOW DENSITY MATERIAL WITH INTERCOMMUNICATING POROSITY dissipates the heat energy by frictional absorption.

PERFORATED, SLOTTED, POROUS, ACOUSTICALLY TRANSPARENT OR DIAPHRAGMATIC FACING relieves the pressure of sound waves and transforms their vibratory energy into heat.



This sketch demonstrates all of the secrets of effective acoustical materials. There just aren't any other secrets — nor are there any short cuts to acoustical efficiency.

If a material does NOT have the pressure converting facing or if it does NOT have the required thickness of frictional absorptive material, it simply will NOT be acoustically effective. If it is NOT backed by a drop space or air columns, it will have negligible low frequency sound absorption.

Thus, if an "acoustical" plaster job is too thin and/or too dense, as are nine out of ten sprayed plaster jobs we have seen in Arizona, it just **can't** have a "good" acoustical value.

What is "good" acoustical value? Well, the accepted criterion is a minimum of 55% NRC. What's NRC? It is simply the "average" absorption, expressed to the nearest 5%, of a material as measured at several frequencies. Incidentally, in selecting acoustical materials for use in auditoria, music or choral rooms, we dare not use the NRC but must use instead the specific absorption values at various frequencies.

Packaged acoustical tile or units have an established, published and **guaranteed** absorption curve, backed by the manufacturer through the Acoustical Materials Association. They are a better buy for your money.

See you later! In the meantime, **Arizona Acoustics** would be delighted to answer your questions, or solve your problems, in acoustics.

# ARIZONA ACOUSTICS

310 S. 29th Street

PHOENIX

BR 5-7716

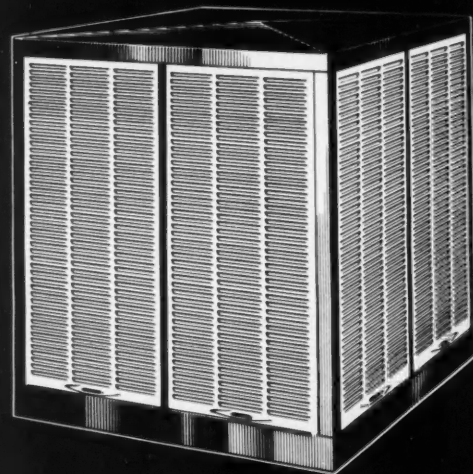
# ECONOMICAL COOLING

*for low-budget projects*



## V-SERIES RESIDENTIAL COOLERS

with capacities from 2,000 to 6,500 CFM.  
Horizontal and down discharge and window  
models available. (Cupola is optional equipment)



**COMMERCIAL/INDUSTRIAL MODELS**  
with capacities from 7,500 to 15,000 CFM.  
May be installed singly or in multiples.

## EVAPORATIVE AIR COOLERS

When you need dependable, low-cost cooling for moderately priced homes and for commercial and industrial buildings such as laundries, dry-cleaning plants, shopping centers, office buildings, warehouses and bowling alleys . . . specify Arctic Circle coolers. They offer a combination of exclusive, time-proved features unmatched by any other make. Arctic Circle features are the result of more than twenty-one years of leadership in evaporative cooler design.

*Catalog and application information sent free upon request.*

### EXCLUSIVE!

Only Arctic Circle has Corobex-treated\*, Microglas-lined† cooling pads in emboss-stiffened\*, recessed\*, Snap-Lock\* pad frames.

\*Patent pending †Patented

INTERNATIONAL METAL PRODUCTS DIVISION

McGraw-Edison Company

500 South Fifteenth Street

Phoenix, Arizona



ALSO MAKERS OF ARCTIC CIRCLE REFRIGERATED  
AIR CONDITIONING EQUIPMENT



